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[The JUPITER of PHIDIAS, as restored by M. Quatremère de Quincy.]

THE JUPITER OF PHIDIAS.

During the administration of Pericles (B.C. 445), the genius of Phidias, the greatest sculptor of antiquity, conceived the daring idea of constructing statues of the gods of Greece which should unite the opposite qualities of colossal dimensions, and materials of comparative minuteness of parts. The sculpture of Greece had been gradually developing itself, through several ages, from the primitive use of the commonest woods as a material, to the employment of those of a rarer growth, such as ebony and cedar,—in clay, in marble, in metals (and those occasionally of the most precious kinds),—till it at length reached, according to the taste of antiquity, the highest point of perfection, in the combination, upon a great scale, of ivory and gold. Independently, indeed, of the delicate texture of ivory, its pleasing colour, and its capacity for the highest polish, there was something wonderfully stimulating to the imagination to consider that the colossal objects of the popular worship, which in their forms alone might well command the most profound reverence,—uniting, as they did, all the characteristics of the lovely, the majestic, and the terrible, in the idea of a superior intelligence—that even a single one of these great works of art had required for its completion the slaughter of hundreds of mighty beasts in distant regions.

The author who has left us the most interesting details of the state of art amongst the Greeks is Pausanias, who published his description of Greece at Rome, during the reigns of the Antonines. In his notices of the remarkable objects which existed in the Grecian cities, we are especially struck with his accounts of those prodigious monuments of sculpture in ivory, of which no specimen has been preserved to us, and which even appear to be repugnant to our notions of the beautiful in art. The remains of ancient statuary in marble and bronze can give us no definite idea of this species of sculpture. We perceive that the most precious substances had been laid under contribution to form these statues; and that the highest genius, calling to its assistance a mechanical dexterity, whose persevering contest with difficulties is alone matter of wonder, had rendered them worthy to be regarded as the perfect idea of the gods, whose individual temples they more than adorned. These extraordinary representations, there can be no doubt, were the glories of the sanctuaries of Athens, of Argos, of Epidaurus, and of Olympia; and were especially suited, by the grandeur of their dimensions, the beauty and rarity of their materials, the perfection of their workmanship, and the ideal truth of their forms, to advance the influence of a religion which appealed to the senses to compel that belief which the reason might withhold. We shall select a few passages from Pausanias and other writers, to justify this account of the peculiar excellence of the colossal statuary of ivory and gold. We begin with that of the Jupiter at Olympia, generally described as the master-piece of Phidias.

"The god," says Pausanias, "made of gold and ivory, is seated upon a throne. On his head is a crown representing an olive-branch. In his right hand he carries a Victory, also of gold and ivory, holding a wreath, and having a crown upon her head. In the left hand of the god is a sceptre shining with all sorts of metals. The bird placed on the summit of the sceptre is an eagle. The sandals of the god are of gold, and his mantle is also golden. The figures of various animals, and of all sorts of flowers, particularly lilies, are painted upon it. The throne is a diversified assemblage of gold, of precious stones, of ivory, and of ebony; in which figures of all kinds are also painted or sculptured."

The Greek traveller then proceeds to describe, at considerable length, the accessories of the statue and the throne, such as the ornaments in bas-relief and the base; but he does not furnish us with the dimensions of this great work. The omission is supplied by Strabo, in a manner which is sufficiently striking. "Phidias," he says, "had made his Jupiter sitting, and touching almost the summit of the roof of the temple; so that it appeared that if the god had risen up he would have lifted off the roof." The height of the interior of the temple was about sixty English feet.

The description of Pausanias, inadequate as it is to give a precise idea of the splendour of this great work of art, which commanded the wonder and admiration of antiquity, is sufficient to show us that the effect produced by the combinations of various materials, in a great variety of colour and ornament, was essentially different from that of the sculpture of marble. The object of the artist was doubtless, in a great degree, to produce an illusion approaching much nearer to reality than the cold severity of sculptured stone. It resulted from the spirit of paganism, that every device of art should be employed to encourage the belief of the real presence of the god in his temple. The votaries indeed knew that the statues of the divinities were the work of human hands; and there was no desire to impose upon the popular credulity in this respect—for the statue of the Olympian Jupiter bore an inscription that it was made by Phidias. But, after every effort of genius had been exerted to produce the most overpowering effect upon the imagination, by an unequalled combination of beauty and splendour, the devices of the priests, or the natural tendency of the votaries to superstition, invented some legends which should give the work supernatural claims to the popular reverence. "The skill of Phidias received," says Pausanias, "the testimony of Jupiter himself. The work being finished, the artist prayed the god that he would make known if he was satisfied, and immediately the pavement of the temple was struck with lightning, at the spot where in my time stands a vase of bronze." But the grandeur of the workmanship was most relied upon to blend in the mind the intellectual idea and the material image of the divinity. "Those who go to the temple," says Lucian, "imagine that they see, not the gold extracted from the mines of Thessaly, or the ivory of the Indies, but the son himself of Saturn and Rhea, that Phidias had caused to descend from heaven." We have the record of Livy that the effect which this wonderful statue produced upon the mind was not limited to the superstition of the multitude. "Paulus Æmilius," says the historian, "looking upon the Olympian Jupiter, was moved in his mind as if the god was present." Up to the time of Antoninus, the reputation of this great work still drew a wondering crowd to Elis; for Arrian mentions that the chef-d'œuvre of art was such an object of curiosity that it was held as a calamity to die without having seen it.

The age immediately preceding that of Phidias had raised up edifices which awaited their final ornament from the hand of so daring a genius. The tyrannical government of Athens, at the period of the fiftieth Olympiad, had employed itself, as is the usage of despotism, in the execution of great architectural works. The Temple of the Olympic Jupiter, in that city, commenced by Pisistratus, was upon so vast a scale that it required the resources of eight centuries for its completion. But the invasion of the Persians gave a more powerful impulse to the mind of Greece, to reconstruct the monuments which their great enemy had destroyed, than even the subtle policy of the tyrants of the preceding generation. The spoils of triumph enabled them to erect monuments in honour of their gods, which should be at the same time trophies of their victories. Within a very few years, were built the temples of Minerva at Athens, of Ceres at Eleusis, of Jupiter at Olympia, of Juno at Argos, and of Apollo Epicurius at Phigalia. At certain periods of society extraordinary impulses are given to the mind of nations, to produce great monuments of art; and thus we see that Greece in little more than half a century covered her land with

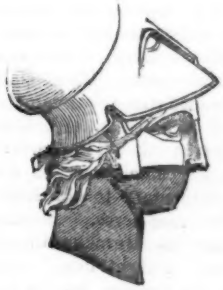
temples. In a similar manner many of the Gothic cathedrals of modern Europe were built at one and the same period. A new career of splendour was opened to Phidias by the magnificence of Pericles. The ancient temples had statues of gold and ivory; but they were not colossal. It was for him to create those gigantic monuments which should cause the shrine to appear too small for the divinity, and thus bring the idea of the infinite and finite into a contrast too powerful for the senses to withhold their homage.

The peculiar merit of this idea of Phidias did not consist in his mere adoption of the colossal form, but in his employment of a minute material to produce in combination the effect of a vast solid surface. The idea of colossal statuary doubtless belongs to the infancy of art. We find the gods of the Hindoo mythology of about three times the height of ordinary men, in the caves of Elephanta; and M. Deguignes saw images thirty feet high in a pagoda of China. The Greeks probably received the taste for the colossal from the Egyptians.

M. Quatremère de Quincy, a living French writer who has written several important works on subjects of art, has devoted a large folio to the history of the ancient sculpture in ivory. A portion of this book is devoted to a demonstration of the mechanical proceedings in the construction of statues of ivory, or of ivory and gold. These details are exceedingly interesting, both to the artist and to the mechanic. His theory is founded upon a consideration of the form of the elephant's tusk, partly hollow and partly solid,—upon the assumption that the ancients were able to obtain tusks of larger dimensions than those ordinarily seen at the present day,—that an art existed of rendering the cylindrical part of the tusk flat when cut through longitudinally,—and that plates might thus be procured from six to twenty-four inches wide. He then conceives that a block of wood having been fashioned as a sort of core for the ivory, the individual plates were fixed upon it, having been cut and polished in exact resemblance to the corresponding portions of a model previously executed. The following woodcuts exhibit (1) the clay model, (2) the separate pieces of ivory for a bust, and (3) the block with a portion of the ivory plated on it.

(1)

(2)



(3)

For fuller details of this subject generally, see the volume on the Elephant, in the 'Library of Entertaining Knowledge.'

STATISTICAL NOTES—(*Continued*).

THE CORN TRADE.

(41.) The importation of corn is a subject which must be considered with peculiar reference to the laws by which such importation is governed. The present corn law (the 9 Geo. IV. cap. 60) came into operation in 1828, and imposes a duty fluctuating according to the average price in this country. The scale of this duty may be judged of by quoting the following extracts from the scale for wheat:—

	Per Quarter.		
When the average price is not under 61*s.* and under 62*s.* per quarter, the duty is	£1	5	8
When 62*s.* and under 63*s.*	1	4	8
„ 69*s.* „ 70*s.*	0	13	8
„ 71*s.* „ 72*s.*	0	6	8
„ 72*s.* „ 73*s.*	0	2	8
At or above 73*s.*	0	1	0

This law is a modification of a more prohibitory system which had been acted upon for some years, but it preserves the principle of the fluctuating scale of duties. Since it came into operation on the 15th July, 1828, up to the 30th of June, 1831, there have been imported in those three years 7,263,184 quarters of corn of every description, being an average of 2,421,061 quarters a year, and the total amount of duty collected upon corn in such three years was £2,096,951. The total quantity of foreign wheat imported in the same period was 4,620,029 quarters, being an average of 1,540,009 quarters a year, and the three years' duty amounted to £1,389,290, being after the rate of 6*s.* 1*d.* per quarter as the mean duty. The annual consumption of corn in the United Kingdom, including what is used for seed, has been estimated as follows:—

	Wheat. Qrs.	Other Grain. Qrs.	Total. Qrs.
Year . . .	12,000,000	40,000,000	52,000,000
Month . .	1,000,000	3,333,333	4,333,333
Week . .	250,000	833,333	1,083,333
Day . . .	35,714	119,048	154,762

(42.) It appears that upon an average of the last three years the quantity of corn imported has been less than two million quarters and a half. But taking the import of the year 1818, viz., 3,522,729 quarters, being the largest quantity imported in any one year, and comparing it with the produce of the kingdom, it will be found to amount to about the fourteenth part of it. It is probable, however, that about half the corn produced is never brought to market, but is consumed by the agriculturists themselves, or used for seed, &c., so that it may be estimated that the quantity of foreign corn in the market has, at the utmost, not exceeded the seventh part of the British corn brought to market. This, however, would have a material influence in alleviating scarcity in a bad year, and checking the rise of prices. It has been doubted, however, whether these objects are attained under a fluctuating system of duties; and a fixed duty of 6*s.* to 7*s.* the quarter has been thought by some preferable to the existing scale, and that it would be a sufficient protection to agriculture.

(43.) Although the interests of agriculture are entitled to consideration, it must not be forgotten that whatever rise of the price of the corn consumed over that which it would otherwise cost is caused by the system of duties, is equivalent to a tax on the consumer to that amount. Now, every shilling duty upon the 52,000,000 quarters consumed is equivalent to a tax of £2,600,000; and estimating the average rise on all sorts of grain at 7*s.* per quarter, the total would be £18,200,000; and supposing one half to be consumed by the agriculturists, then the amount would be £9,100,000. Upon the corn laws in general it may suffice to remark that in all political measures, where there are conflicting interests, it is necessary often that each should give and take something for the general good of the whole; and if on

the one hand it is unfair in the consumer to object to the reasonable protection of the British agriculturist, it would, on the other, be no less censurable in the agriculturists for them to endeavour to separate their particular interest from the general good.

[To be continued.]

THE CAMEL.

[The Arabian Camel.]

Over the arid and thirsty deserts of Asia and Africa, the camel affords to man the only means of intercourse between one country and another. The camel has been created with an especial adaptation to the regions wherein it has contributed to the comfort, and even to the very existence, of man, from the earliest ages. It is constituted to endure the severest hardships with little physical inconvenience. Its feet are formed to tread lightly upon a dry and shifting soil; its nostrils have the capacity of closing, so as to shut out the driving sand, when the whirlwind scatters it over the desert; it is provided with a peculiar apparatus for retaining water in its stomach, so that it can march from well to well without great inconvenience, although they be several hundred miles apart. And thus, when a company of eastern merchants cross from Aleppo to Bussora, over a plain of sand which offers no refreshment to the exhausted senses, the whole journey being about eight hundred miles, the camel of the heavy caravan moves cheerfully along, with a burden of six or seven hundred weight, at the rate of twenty miles a day; while those of greater speed, that carry a man, without much other load, go forward at double that pace and daily distance. Patient under his duties, he kneels down at the command of his driver, and rises up cheerfully with his load; he requires no whip or spur during his monotonous march; but, like many other animals, he feels an evident pleasure in musical sounds; and therefore, when fatigue comes upon him, the driver sings some cheering snatch of his Arabian melodies, and the delighted creature toils forward with a brisker step, till the hour of rest arrives, when he again kneels down, to have his load removed for a little while; and if the stock of food be not exhausted, he is further rewarded with a few mouthfuls of the cake of barley, which he carries for the sustenance of his master and himself. Under a burning sun, upon an arid soil, enduring great fatigue, sometimes entirely without food for days, and seldom completely slaking his thirst more than once during a progress of several hundred miles, the camel is patient, and apparently happy. He ordinarily lives to a great age, and is seldom visited by any disease.

Camels are of two species. That with one hump, which is represented with his ordinary pack-saddle in the wood-cut, is the Arabian camel, and is usually called the dromedary. The species with two humps is the Bactrian camel. The Asiatics and Africans distinguish as dromedaries those camels which are used for riding. There is no essential difference in the species, but only in the breed. The camel of the heavy caravan, the baggage camel, may be compared to the dray-horse; the dromedary to the hunter, and, in some instances, to the race-horse. Messengers on dromedaries, according to Burckhardt, have gone from Daraou to Berber in eight days, while he was twenty-two days with the caravan on the same journey. Mr. Jackson, in his account of the Empire of Morocco, tells a romantic story of a swift dromedary, whose natural pace was accelerated in an extraordinary manner by the enthusiasm of his rider: "Talking with an Arab of Suse,

on the subject of these fleet camels, and the desert horse, he assured me that he knew a young man who was passionately fond of a lovely girl, whom nothing would satisfy but some oranges; these were not to be procured at Mogadore, and, as the lady wanted the best fruit, nothing less than Marocco oranges would satisfy her. The Arab mounted his heirie at dawn of day, went to Marocco (about one hundred miles from Mogadore), purchased the oranges, and returned that night after the gates were shut, but sent the oranges to the lady by a guard of one of the batteries."

The training of the camels to bear burthens, in the countries of the East, has not been *minutely* described by any traveller. M. Brue, who, at the latter part of the seventeenth century, had the management of the affairs of a French commercial company at Senegal, says, "soon after a camel is born, the Moors tie his feet under his belly, and having thrown a large cloth over his back, put heavy stones at each corner of the cloth, which rests on the ground. They in this manner accustom him to receive the heaviest loads." Both ancient and modern authors agree tolerably well in their accounts of the load which a camel can carry. Sandys, in his Travels in the Holy Land, says, "six hundred weight is his ordinary load, yet will he carry a thousand." The caravans are distinguished as *light* or *heavy*, according to the load which the camels bear. The average load of the heavy, or slow-going camel, as stated by Major Rennell, who investigated their rate of travelling with great accuracy, is from 500 to 600 lbs. Burckhardt says, that his luggage and provisions weighing only 2 cwt., and his camel being capable of carrying 6 cwt., he sold him, contracting for the transport of his luggage across the desert. The camel sometimes carries large panniers, filled with heavy goods; sometimes bales are strapped on his back, fastened either with cordage made of the palm-tree, or leathern thongs; and sometimes two, or more, will bear a sort of litter, in which women and children ride with considerable ease.

The expense of maintaining these valuable creatures is remarkably little: a cake of barley, a few dates, a handful of beans, will suffice, in addition to the hard and prickly shrubs which they find in every district but the very wildest of the desert. They are particularly fond of those vegetable productions which other animals would never touch, such as plants which are like spears and daggers, in comparison with the needles of the thistle, and which often pierce the incautious traveller's boot. He might wish such thorns eradicated from the earth, if he did not behold the camel contentedly browsing upon them; for he thus learns that Providence has made nothing in vain. Their teeth are peculiarly adapted for such a diet. Differing from all other ruminating tribes, they have two strong cutting teeth in the upper jaw; and of the six grinding treth, one on each side, in the same jaw, has a crooked form: their canine teeth, of which they have two in each jaw, are very strong; and in the lower jaw the two external cutting teeth have a pointed form, and the foremost of the grinders is also pointed and crooked. They are thus provided with a most formidable apparatus for cutting and tearing the hardest vegetable substance. But the camel is, at the same time, organized so as to graze upon the finest herbage, and browse upon the most delicate leaves; for his upper lip being divided, he is enabled to nip off the tender shoots, and turn them into his mouth with the greatest facility. Whether the sustenance, therefore, which he finds, be of the coarsest or the softest kind, he is equally prepared to be satisfied with and to enjoy it.

ÆSCHINES.

To convey to a person unacquainted with the Greek language any accurate idea of the style of the great writers of Athens, is perhaps not an easy task; and certainly it is an undertaking that has seldom been successfully accomplished. The chief difficulty appears to be, that the reader cannot so far remove all his present associations as to transport himself into a new set of circumstances, and to figure to himself the social life and modes of thought that prevailed in a nation which existed more than two thousand years ago. If it is often difficult for an Englishman to comprehend the thoughts and expressions of foreign writers of his own time, as undoubtedly it often is, how much must the difficulty be increased when he endeavours to understand a writer of a remote age, living under a political and religious system entirely different from any thing existing at the present day? And if to this we add, that all the common books which treat of matters of antiquity only convey false impressions, it is no wonder if we see these untrue pictures reflected and even magnified on every occasion when they are pressed into service by the political speaker or the political writer.

Another defect in translation is the preference of fine words and rounded sentences to simple and unpretending language. It may be safely laid down as a general rule in translating from one language into another, that, if ever we desert simplicity of expression, we run the risk of impairing or altering the meaning of the original.

In the following specimen, taken from the opening of an oration of Æschines, we have attempted nothing more than to express in the plainest English the meaning of the speaker; and it will only require a few words of previous explanation to render the whole intelligible to any person. The skill of a practised speaker and writer (for we must bear in mind that these speeches were nearly always written before they were pronounced,) will easily be recognized in this opening address of Æschines.

Demosthenes and Æschines had formed part of a commission sent to treat with Philip of Macedon, the father of Alexander the Great, about the terms of a peace. After their return from the second embassy Demosthenes instituted a prosecution against Æschines for malversation in the mission, and for bribery and corruption. He sold the interests of his native city, as Demosthenes alleges, for Philip's gold. The speech of Demosthenes, which still remains, though perhaps not one of the best specimens of his skill, is still a highly laboured production, abounding in ingenious sophistry, and seasoned with that high tone of personal abuse and invective in which he was so accomplished a master. Æschines replied with no less art and ingenuity, and, as the story goes, escaped a conviction. It should be recollected that the accused had, according to general usage at Athens, to address a very numerous jury, whose vote was given by ballot, and whose opinion was decided by that of the majority.

"I pray you, Athenians, to listen to me with favour, considering the magnitude of my danger, and the variety of charges to which I must reply; considering, too, the arts and intrigues of my accuser, and his unfeeling temper. For he has been bold enough to tell you not to listen to the accused; *you*, who are bound by oath to give both parties a fair hearing. And it was not in the heat of passion that he said this, for no man when he is lying *can* feel anger against the person whom he is falsely accusing. Nor yet do those who speak the truth ever try to hinder the accused from making his defence; for we know that an accusation prevails not with those who are to judge till the accused has made his defence, and shown himself unable to answer the charge. But Demosthenes, I know, is not fond of fair discussion, nor does it form any part of his present policy: his design has been to rouse your passions, and therefore has he ventured to accuse me of corruption, *he* who can have no great weight in sustaining such a charge. When

a man tries to move your indignation against corruption, it is essential that he should be altogether free from the imputation himself.

"Never before has it been my lot to feel such alarm, to be moved with such indignation, nor yet to enjoy such unbounded satisfaction, as on the present day, while I have been listening to the speech of Demosthenes. I felt alarm, and indeed I do still feel apprehension, that some of you will hardly know me after being spell-bound and deceived by the insidious and malicious contrasts in which he has placed all my actions: I was almost beside myself with indignation, when I heard him accuse me of drunken brutal violence to a free woman of Olynthus: but I was delighted to see you stop him short in the midst of his abuse; and this I feel to be a full reward for my sober and blameless life.

"For this you deserve my thanks; and I am most especially pleased that you choose to judge of a man rather according to the whole tenor of his life, than from the charges of a malicious enemy. But still I shall not decline answering the imputation. If there is a single man in all the crowd around us—and I think we have pretty nearly all the citizens present—or if there is one individual of the jury ready to believe that I ever did so shameful a thing, were it even to a slave, I should not think my life worth preserving. And further, if I do not in the course of my defence prove the charge to be entirely false, and the man who has had the impudence to make it an unprincipled and malicious accuser, and if I do not acquit myself of blame in every other matter, let my sentence be—death. And, concerning the rest of the charges, I entreat you, my judges, if I pass over any thing and do not notice it,—question me and let me know what you wish to hear from me; not prejudging me, but listening fairly to both parties. And indeed I hardly know where to begin my defence, so irregular is the charge brought against me. And I beg you just to consider if I am put in a fair position. The man whose life is now at stake is *myself:* but the chief weight of the accusation is against Philocrates, Phryno, and the rest of the ambassadors, and against King Philip, and against the terms of the peace, and against the policy of Eubulus: and *I* am brought in on all these occasions. Demosthenes, it seems, according to his own account, is the only man who looks after the true interests of the state—all the rest are traitors.

"In replying to such impudence and marvellous knavery, it is difficult to recollect all the particulars of an accusation, and difficult too, when a man's life is at stake, to disprove such unexpected calumnies. But in order that my statement may be as clear as possible, and perfectly intelligible and fair, I will begin with the discussions about the peace, and the nomination of the ambassadors. Following this plan I shall be best able to recollect and to state the facts, and you will be best enabled to understand them."

ALBERT DURER.

Albert Durer, who was born at Nuremberg on the 20th of May, 1471, and died at the same place on the 6th of April, 1528, was equally eminent as a painter and as an engraver, and decidedly surpassed all his countrymen in both capacities during the age in which he flourished. In the history of early engraving, indeed, there is scarcely perhaps a greater name than his; and we shall take the opportunity of giving in connexion with it a short notice respecting that art.

Some writers are fond of carrying the origin of engraving to a very high antiquity, by quoting as examples of the practice of the art such carvings in wood or metal, or stone, as have been found in various degrees of excellence among almost all nations,—among our own Saxon and even British ancestors, as well as among the Egyptians, Greeks, and Romans. But this is to confound two things which are entirely distinct. Such works as those alluded to are specimens of sculpture, not of what we now call engraving. The modern art known by that name applies to the production of a print, or rather of a number of prints, from a design cut in wood or metal. The mere cutting out both of letters and of figures in a hard substance has been practised from the earliest ages; the art of obtaining letters and figures so cut out from copies or impressions by means of a colouring matter spread over them, and thence transferred to some other substance, is, in Europe at least, altogether a modern invention. The ancients were, indeed, accustomed to produce impressions by means of stamps in a variety of cases; they struck coins, they made seals in wax, they even marked the weight and quality on their loaves of bread with a stamp. On the other hand, they applied a coloured liquid to make marks, both in their painting, with a brush or pencil, and in writing, with a reed or other species of pen. What they did not do was just to use the two methods at once,—to take the impression from the stamp, not by making it enter into the substance of the material on which it was pressed, but only by making it communicate to that material a fluid colour. The principal cause undoubtedly which prevented the ancients, after advancing so far as they did, from discovering the art of printing, was the want of any general demand for books. A high price, it is true, was paid for books, and must have been paid, by the few who did buy them; the labour necessary for the copying of a manuscript was great, and a book therefore could not be obtained for a small sum. If there be an article which from its nature cannot be expected to ensure more than a very limited demand, let it be produced at what price it may, it is evident that in the case of that article the usual incentives are in great part wanting which excite the ingenuity of the manufacturer to endeavour, as in all other cases, to find out the cheapest way of producing it. Now, in Greece and Rome, and also throughout the middle ages, this appears to have been nearly the case with books Very large prices were obtained for manuscripts upon which much labour had been bestowed; but the number of purchasers was extremely limited: and from the state of the general population it was scarcely to be expected that a reduction of price would ensure any considerable extension of the market.

It was the general demand for the Bible, or rather perhaps for religious manuals of various descriptions, which first altered this state of things; and, to that cause therefore we owe the art of printing, whether as regards printing from moveable types, or from blocks of wood, or from metal plates. The step from what had been already done to the completion of this great invention was so immediate and easy, that we seem to be quite warranted in accounting for its not having been made sooner, simply from the absence of any strong inducement to make it. There was no one book of which more than a few dozen copies were actually sold, or could reasonably be expected to be sold, at any such moderate reduction of price as the application of more ingenuity to the manufacture was likely to allow; such application therefore was not thought of. But when, in the early part of the fifteenth century, after the several nations of Europe had settled down, and as it were ripened into something like social organization, and the revival of classical learning had spread abroad over the community a much more general scholarship than before existed, the demand grew up not merely among the clergy, but to a great extent among the laity also for the Latin Scriptures, and other devotional works. A state of things then for the first time presented itself, in which it might be considered certain, that a reduction of price would bring with it a large extension of the market. In the case of one class of books, at least, this was sure

to follow; and religious books accordingly were the first to which the new art was applied.

The art of printing would probably of itself have speedily led to that of engraving; but in point of fact, it would rather appear that the latter had a distinct origin of its own. As the general demand for the Bible prompted the one invention, so a general demand of a very different kind, that, namely, for playing-cards, seems to have previously suggested the first idea and application of the other. Playing-cards were certainly known in Germany before the year 1376. It is probable that they were at first painted individually by the hand, as books were written; and the more expensive sorts may have long continued to be prepared in this way. But it appears certain, that the makers at length began to stamp them from blocks, probably of wood, when they had come into general use. Here, then, was what we now call wood-engraving invented and put in practice. In this process, as in letter-press printing, the mark is made upon the paper by the raised parts of the stamp, or rather by those which are not cut away; the scooped-out parts receiving no ink, and of course transmitting none to the paper. The method of printing from a wood-cut, therefore, is exactly the same with that of printing from ordinary types; and the two can be accordingly combined in the same page. Wood-cuts were introduced into books very soon after the invention of printing. The process of copper-plate printing proceeds upon a different principle. In the copper, the parts which are to receive the ink and make the impression are cut out, either in lines or dots, and the surface of the metal which remains raised leaves no mark. To prevent it therefore from retaining any ink, this surface has to be carefully rubbed dry after every impression, and only the ink which is in the hollows of the plate allowed to remain. This makes copper-plate printing an exceedingly tedious operation, and also one which cannot be combined with that of letter-press. These repeated rubbings, too, very soon wear out the plate; but this last disadvantage has of late years been completely obviated by the substitution of steel for copper, in every department of metallic engraving where large numbers of impressions are required. When in steel or copper engraving, the dark parts of the picture are cut out in lines, the process is called line-engraving; when in dots, it is called dot-engraving, or stippling. In both, the shades are made lighter or deeper by the lines or dots being kept more or less apart. Frequently, however, these marks are not made by a cutting-tool, but by the method called *etching*, which consists in the application of aqua-fortis, or some other acid, to bite into the metal. In nearly all plates etching is the first step in the process. The surface of the plate is spread over with a composition or varnish which is not affected by the action of the acid; to this the design intended to be engraved is transferred, either by being drawn upon it (in reverse of course) with the hand, or by its outlines, traced with a black lead pencil, being at once impressed upon the composition by passing it through the rolling-press. The varnish, or ground, as it is called, is then carefully cut away down to the copper, wherever it is thus marked. After this the aqua-fortis is poured over the whole, and kept standing upon it by a rim of wax erected around the plate, until it is considered to have eaten deep enough into the copper at those places from which the varnish has been removed. The lines thus formed, however, frequently receive a finishing touch from the graver; and one part of a plate is often wholly cut by the graver, while another part not requiring the same delicacy of touch is done by the easier method of etching. Albert Durer has been usually stated to have been the inventor of etching; and he was undoubtedly the person by whom it was first brought to any degree of perfection. Lastly, there is the process, commonly called among us mezzotinto-engraving (that is, half-painting, from the effect it produces being conceived to resemble that of colours), but by foreigners the black manner, or sometimes the English manner. Its invention has been ascribed to Prince Rupert; but it was practised by others before him, and it is now generally allowed that we are indebted for it to a German military officer, of the name of Siegen, or Sichem. The whole surface of the plate is first made rough and raised up by being, as it were, repeatedly harrowed in various directions by an instrument called the grounding-tool, adapted to that purpose. All that has then to be done is to bruise down and smooth with the burnisher those places which are to represent the bright or less shaded parts of the design, the smoothing being made partial or complete according as more or less shade is necessary.

COCOA.

In consequence of a diminution in the duty on cocoa, a very nutritious and cheap article of food is now placed within the reach of almost all classes of persons, and a short account of it may be acceptable to our readers.

The cocoa, or cacao, is known to botanists under the name of *Theobroma cacao*, Linnæus having given it the first appellation to designate its excellent qualities, *Theobroma*, signifying "food for a god." The same naturalist placed it in the class *Monadelphia decandria* (i. e. having ten stamens, united into a tube round the pistil); but later authors refer it to the natural family of the *Malvaceæ* (mallows), most of the genera of which are highly useful to man.

The cacao is a native of South America, where it was not only used for food, but the seeds served as money. The tree is not unlike that of the cherry in form, and seldom exceeds twenty feet in height. The leaves are oblong, and pointed at the end, and when young are of a pale red. The flowers, which generally spring from the wood of the large branches of the tree, are small, and of a light red colour, mixed with yellow; the pods which succeed them are oval, and are green when young, but as they ripen they become yellow or red. They are filled with a sweet, white pulp, which surrounds the many seeds contained in each of the five cells, or divisions. When travelling, the native Indians eat this pulp, and find it very refreshing. The seeds are steeped in water previous to their being sown, and lose the power of reproduction in a few days after they are taken from the pod. As the plant grows up, the shade of the coral-tree is considered so essential, that it is called by the Spaniards the *Madre del cacao*, or mother of the cocoa. When this tree is covered with its bright scarlet blossoms it presents a splendid appearance.

It appears that there are two varieties of the cocoa in Trinidad, to which colony, and that of Grenada, the English plantations are now chiefly confined; the one variety is called the Creole cocoa, which is by far the best, but not so productive as the other sort, which has nearly superseded it, and bears the name of *Forastero*, or foreign. The former suits the Spanish market best, the latter having a somewhat bitter taste. The Creole begins to bear after about five years' growth, but does not reach perfection till the eighth year; it, however, yields good fruit for twenty years. The *Forastero* produces fruit at three years, and both, probably, come from the Spanish Main. It was formerly the practice in Trinidad to grant manumission to every slave who could at any time deliver up to his master one thousand cocoa-trees, planted by himself, in a space expressly allotted to them, in a state of bearing. Many instances of freedom obtained in this way might be cited, as the cultivation of them at any time did not infringe too much upon the daily tasks, and where nature had already provided shade and moisture, was comparatively trifling. In Grenada the plantations are beautifully situated among the mountains, and the labourers can work at

all hours in the shade; but the cocoa walks are now chiefly cultivated by free coloured people, most of whom are settlers from the Spanish Main.

[Leaf, flower, and fruit of the Cacao, with a pod opened.]

The seeds of the cocoa-tree are gathered twice every year, but the largest crop is yielded in the month of December; the other is ready in June. When picked, and extracted from the pods, they are placed in heaps, on platforms of clay, where they are suffered to ferment for forty-eight hours or more; they are then dried in the sun, exactly imitating the process used with coffee. When required for use, they are roasted till the husks may be readily taken off; and if to be converted into chocolate, they are bruised and worked with the hand into a paste, which is afterwards made still finer by a smooth iron. This is afterwards flavoured with various ingredients, the principal of which are cinnamon and vanilla; the latter is a climbing plant, indigenous to Trinidad, and bears long slender pods. A great consumption of chocolate takes place in Spain, where it is considered as a necessary of life. In France it is also much used, and is fashioned into an endless variety of forms.

When the seeds are to be made into cocoa they are ground to a fine powder. The husks, boiled in milk, make a thin and delicious beverage, and are in great request in France, for delicate persons who find the paste or powder too rich for them.

An excise duty on chocolate, and heavy duties on cocoa, have hitherto prevented any great consumption of these two articles in England, and the principal demand for the latter has hitherto been in the navy, each sailor's allowance being an ounce per diem, which affords him a pint of good liquid. The late reduction of duty will probably bring cocoa into more general use, as it is now half the price of coffee, and one-fifth that of tea, and certainly far more nutritious than either.

GENERAL EDUCATION.

In an article in the Quarterly Journal of Education, No. X., just published, is given the following outline of a proposed course of instruction for the children of the poorer classes:—

Besides reading, writing, and arithmetic, the following subjects ought to be taught:

Reading ought to be united with *history*. The best and first history, of course, is that of the pupil's native country, which should be written, we need hardly say, very differently from any book of the class yet published. A school library, stored with useful books, might afford inestimable advantages. And why should England see her labours for promoting knowledge and enlightening mankind, turned to a better account in other countries than in her own?

To *writing*, i. e. calligraphy and orthography, should be added lessons on the *general principles* and nature of *language*.

Elementary drawing, which has been so often recommended, should certainly be a part of the education of all classes. It might be confined to the slate, and consist in teaching to draw straight and curved lines, with regular figures, accompanied by drawings composed of these lines and figures; and, finally, the pupil should draw various real objects. This branch of drawing proceeded from, and is cultivated in, Pestalozzian schools.

The copying of pattern drawings and objects of nature must be chiefly left to the taste and opportunities of every individual pupil. The symmetrical figures, or compositions expressing merely symmetry—such as architectural ornaments, patterns of vessels, furniture, &c. need only be drawn on slates during the lesson, and may afterwards be copied at home into books with lead pencil, by those who show any taste and wish for it; and their books might occasionally be brought to school for the inspection of the master. There is little doubt that those who, after leaving school, enter trades may derive the greatest advantages from those lessons of drawing, which develope and cultivate a taste for beauty and symmetry of form. Such practice would, undoubtedly, soon have a beneficial effect on all great branches of our national industry, where the taste of the workman is called into action.

Geography, at least that of their own country, and in the upper classes a general description of the globe, ought to be taught in all schools, with the aid of maps, &c., accompanied in each case with an account of the natural and manufactured products which characterize each country.

Arithmetic is indispensable; and some elements of *Geometry* might be given in the drawing lesson.

Music also should be taught. The objection, that this is impracticable, because English boys, generally speaking, possess no ear for music, is quite groundless; for experience in a sufficient number of instances to warrant a general rule, has proved the contrary to be the case. English boys are naturally quite as musical as German and French boys, and in Germany singing is taught in every school. Music was generally cultivated in England at one time, and it will again become general, and increase content and happiness, when the condition of the poorer classes will allow them a little more comfort and rational enjoyment than they now possess.

Religious and *moral instruction* need not be particularly specified here; it is that on which the success of all other instruction chiefly depends.

By what means the general instruction of the lower classes can be effected to the extent here briefly pointed out, is a question which belongs to the government to answer, and we hope they will soon speak out. This much may be said, that in the immense resources, and in the liberality and charitable character of the English nation, there will be found sufficient means for establishing a school in every village, throughout England and Wales, conducted on a plan similar to those in Germany, and particularly in Prussia. Parents ought to pay a trifle to prevent their undervaluing that which they can have for nothing. Boys ought to be compelled to attend these schools regularly, at least, to their fourteenth, girls to their thirteenth, year. No one who knows the English character will doubt that, if these village schools once obtained general esteem, there would be no want of exhibitions and prizes, &c. to enable the boy, who showed distinguished abilities and a good character, to go to a grammar school, and if he conducted himself well, to obtain any honour and advantages which education can confer.

*** The Office of the Society for the Diffusion of Useful Knowledge is at 59, Lincoln's-Inn Fields.

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